

REMARKS

Claims 1, 9, 24, and 28-30 are amended hereby. Claim 27 is canceled without prejudice or disclaimer of the subject matter contained therein. Accordingly, after entry of these amendments, claims 1-26 and 28-44 will remain pending.

In the Office Action dated April 1, 2005, the Examiner objected to claim 9, finding that the claim included two periods. The Applicant has amended claim 9 to remove the second period. Accordingly, the Applicant respectfully requests that the Examiner withdraw the rejection to claim 9.

Before addressing the rejections set forth by the Examiner, the Applicant would like to thank the Examiner for the indication that claims 27-29 would be allowable if rewritten in independent form to include the limitations of the base claim and any intervening claims. In response, the Applicant has amended claim 24 to include the limitations formerly found in claim 27 and has canceled claim 27. With this amendment, the Applicant has also amended claims 28 and 29 so that they depend from claim 24. In making these amendments, the Applicant respectfully submits that claims 24-26 and 28-29 are now in condition for allowance. Accordingly, the Applicant respectfully requests that the Examiner pass claims 24-26 and 28-29 to issuance.

In making the amendment to claim 24 and changing the dependency of claims 28 and 29, the Applicant respectfully points out that the subject matter of claim 24 is now identical to the subject matter of claim 27 as originally presented. Moreover, claims 28 and 29 have not been altered in their content in any way because they were originally dependent upon claim 27. Accordingly, the Applicant respectfully submits that these claim amendments should not affect the scope of the claims, either literally or under the doctrine of equivalents. The Applicant explicitly intends for the claims

to have as broad a scope as possible, both literally and under the doctrine of equivalents, as though the claims had been presented for examination in the manner as now amended.

Claims 1-4, 6-21, and 23-26 were rejected under 35 U.S.C. § 103(a) as unpatentable over Niimi et al. (U.S. Patent No. 6,503,846). The Examiner rejected claim 30 under 35 U.S.C. § 103(a) as unpatentable over Niimi et al. in view of Subramony et al. (U.S. Patent Application Publication No. 2003/0138562 A1).

Claims 31-42 were rejected under 35 U.S.C. § 103(a) as unpatentable over Niimi et al. and Subramony et al. in view of Ikakura et al. (U.S. Patent No. 6,255,230). The Examiner also rejected claims 5 and 22 under 35 U.S.C. § 103(a) as unpatentable over Niimi et al. in view of Solayappan et al. (U.S. Patent No. 5,997,642). In addition, claims 43-44 were rejected under 35 U.S.C. § 103(a) as unpatentable over Niimi et al. and Subramony et al. in view of Solayappan et al. The Applicant respectfully disagrees with each of these rejections and, therefore, respectfully traverses same.

Claims 1-23 and 30-44 have been amended to specifically point out, among other features, that the method and the processing system include forming an oxynitride layer via a self-limiting, thermal oxidation process. This change is being made explicitly to distinguish the method and processing system from the prior art by distinguishing the method and processing system from prior art systems, such as the one described by Niimi et al., which rely on a plasma to create the oxynitride layer. Since the prior art does not describe or suggest a method or processing system that creates an oxynitride layer in the absence of a plasma, the Applicant respectfully points out that the prior art cannot be relied upon to sustain a rejection of the claims under U.S.C. § 103. Accordingly, the Applicant respectfully requests that the Examiner withdraw the rejections and pass this application quickly to issue.

In contrast to the present invention, Niimi et al. describes a temperature spike for uniform nitridation of ultra-thin silicon dioxide layers in transistor gates. As described by Niimi et al., the substrate 101, which is preferably a silicon substrate, has a surface 102 with an insulating layer 103 thereon. (Niimi et al. at col. 4, lines 15-20.) The insulating layer 103, which is preferably silicon dioxide, is grown by rapid thermal oxidation in a furnace. (Niimi et al. at col. 4, lines 20-24.) Since the insulating layer has a thickness of 0.8 to 2.0 nm, it is classified as an “ultra-thin” oxide layer. (Niimi et al., at col. 4, lines 24-26.)

Fig. 2 of Niimi et al. illustrates the process step 204 of plasma nitridation of the insulating layer 103. (Niimi et al. at col. 4, lines 30-31.) Nitridation occurs by exposing the insulating layer 103 to a nitrogen-containing plasma. (Niimi et al. at col. 4, lines 30-49; see also Niimi et al. at col. 5, lines 52-56.) At no point does Niimi et al. describe nitridation of the insulating layer 103 by any other process, nor would those skilled in the art understand Niimi et al. to describe any other process. Every embodiment described by Niimi et al. relies on a nitrogen-containing plasma for nitridation. Accordingly, Niimi et al. does not describe or suggest a method or processing system relying on a self-limiting, thermal oxidation process.

Since Niimi et al. does not describe or suggest the features recited by the claims, Niimi et al. cannot be relied upon to render unpatentable claims 1-23 and 30-44. Accordingly, the Applicant respectfully submits that the rejections under 35 U.S.C. § 103 be withdrawn.

Subramony et al., Ikakura, and Solayappan et al. do not assist the Examiner in sustaining a rejection against any of the claims because these references fail to cure the deficiencies noted with respect to Niimi et al. Accordingly, the Applicant

respectfully requests that the rejections relying on more than Niimi et al. also be withdraw so that this application may be passed to issuance.

Subramony et al. describes methods for silicon oxide and oxynitride deposition using single wafer low pressure CVD. To create an oxynitride layer, Subramony et al. introduces both a silicon-containing gas and a nitrogen containing gas into the reaction chamber 490. (Subramony et al. at paragraphs [0075] and [0076].) The reactant gases are thermally decomposed to form the oxide or oxynitride for deposition on the surface of the substrate 300. (Subramony et al. at paragraphs [0062] - [0064] and [0077] -[0079].) No where, however, does Subramony et al. describe a self-limiting, thermal oxidation process for the creation of an oxynitride layer. Accordingly, contrary to the Examiner's assertion, Subramony et al. cannot be properly combined with Niimi et al. to render obvious claim 30. As a result, the Applicant respectfully requests that the rejection be withdrawn.

Ikakura et al. does not assist the Examiner with the rejection of claims 31-42 because Ikakura et al. does not cure the deficiencies noted with respect to Niimi et al. and Subramony et al. Ikakura et al. describes a method of modifying a film forming surface of a substrate on which a film is to be formed. Specifically, Ikakura et al. concerns a step, prior to a CVD step (e.g., the CVD process of Subramony et al.), that modifies the surface of a silicon dioxide film, a silicon nitride film, or the like. (Ikakura et al. at col. 1, lines 11-20, and col. 4, lines 54-67.) No where does Ikakura et al. describe or suggest a self-limiting, thermal oxidation process as recited by the claims. Accordingly, the Applicant respectfully submits that the rejection of claims 31-42 cannot be maintained.

Solayappan et al. does not assist the Examiner with the rejection of claims 5, 22, and 43-44 because this reference also shared the same deficiencies as the

remaining references. Specifically, Solayappan et al. describes a method and apparatus for misted deposition of integrated circuit quality thin films. The film is formed from a liquid precursor, such as strontium bismuth tantalate. (Solayappan et al. at col. 7, lines 33-44.) No where does Solayappan et al. discuss at least a self-limiting thermal oxidation process for the formation of an oxynitride layer. Accordingly, the reference cannot be properly combined to render the claims unpatentable.

Each of the rejections asserted by the Examiner having been addressed, the Applicant respectfully submits that claims 1-26 and 28-44 are patentable over the references cited by the Examiner. Accordingly, the Applicant respectfully requests that the Examiner withdraw the rejections asserted against claims 1-26 and 28-44 and pass this application quickly to issue.

If the Examiner believes a telephone conference would be helpful, he is invited to contact the undersigned at the telephone number given below.

Respectfully submitted,

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